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COMPONENTS FOR SCHOOL CONSTRUCTION IN THE MID-HUDSON REGION. PROGRESS REPORT 1.

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THIS REPORT IS PART 1 OF A FEASIBILITY STUDY TO SAMPLE APPROPRIATE ASPECTS OF THE SCHOOL CONSTRUCTION FACTORS IN NEW YORK STATE. THE STUDY IS TO DETERMINE WHETHER THE SCHOOL CONSTRUCTION SYSTEMS DEVELOPMENT PROCESS IS APPLICABLE TO SCHOOL CONSTRUCTION IN THE MID-HUDSON VALLEY. THE STUDY ALSO EXPLORES POSSIBLE MEANS BY WHICH SUCH SCHOOL BUILDINGS MIGHT BE ACCOMPLISHED. THE USE OF THE SCSD APPROACH FOR ANTICIPATING CONSTRUCTION PROBLEMS IS JUSTIFIED ON THE BASIS OF ITS SUCCESSFUL APPLICATION IN OTHER GEOGRAPHICAL AREAS. THE REPORT REVIEWS THE SCSD OBJECTIVES OF DEVELOPING STANDARDIZED BUT VERSATILE COMPONENTS, REDUCTION OF COST AND TIME, ASCERTAINING A LARGE MARKET FOR THE MANUFACTURER, REAPPROPRIATION OF ARCHITECTUAL DESIGN TIME AND FLEXIBILITY FOR INDIVIDUAL DISTRICT DESIGN. THE BASIC STEPS IN THE SCSD PROCESS ARE PRESENTED. THE STEPS ARE RELATED TO THE MID-HUDSON VALLEY PROJECT BY A COMPARISON TO SIMILAR PROJECTS BEING CONDUCTED IN CALIFORNIA. (GM)

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Components for School Construction in the Mid-Hudson Region

CENTER FOR ARCHITECTURAL RESEARCH
RENSSELAER POLYTECHNIC INSTITUTE

PROGRESS REPORT 1

EF000095

Components for School Construction in the Mid-Hudson Region . . .

a feasibility study to sample all appropriate aspects of the school construction climate in New York State to determine whether the "SCSD Process" is applicable to school construction in the Mid-Hudson Valley and explore possible ways that such school building programs might be accomplished.

THE INTEREST . . .

The Mid-Hudson School Study Council, covering 51 school districts in 5 New York counties is interested in exploring the feasibility of a co-operative approach to school construction in New York and in the Mid-Hudson Valley through the joint development and purchase of building components.

THE SUPPORT . . .

Educational Facilities Laboratories, having underwritten the similar SCSD project in California, offered to support the feasibility study in New York State.

THE STUDY . . .

The School of Architecture at Rensselaer Polytechnic Institute is conducting this feasibility study which will be completed in the fall of 1965.

SCHOOL CONSTRUCTION SYSTEMS DEVELOPMENT (SCSD) is the title of the co-operative components project conducted by Educational Facilities Laboratories, School Planning Laboratory at Stanford University, and the Department of Architecture at the University of California at Berkeley. The project involved 13 school districts in 22 separate building projects totalling about $ 30 million in construction, and resulted in developing four components representing about 50% of the total school building.

- THE FEASIBILITY STUDY
- WHY A COMPONENTS APPROACH?
- THE SCSD APPROACH . . . ITS LESSONS FOR THE MID-HUDSON

The Feasibility Study .....

PHASE I

The first phase of the project has allowed all concerned to become familiar with the SCSD Process, and to begin an investigation of its applicability in the Mid-Hudson Region. Steps in this phase included:

- Developing the detailed program for the feasibility study.
- Reviewing all current information on SCSD and abstraction of pertinent data and information.
- Discussion with Bert Ray, formerly of the SCSD Professional Staff, to gain first-hand information and recommendations concerning SCSD.
- Scheduling an Introductory Seminar, held on the Rensselaer campus June 10, which brought together the Project Staff, MHSSC and EFL representatives, personnel of the State Education Department and Bert Ray to communally review SCSD and to discuss its applications in the Mid-Hudson.
- Beginning the exploration of the State Education Law to establish any limitations or restrictions on using such a process in New York State.

The issuance of this Progress Report concludes Phase I.

PHASE II

The second phase will initiate detailed study of many aspects of the construction climate to determine the applicability of an SCSD-type approach in the Mid-Hudson area.

- Organization of a tour to visit and talk with SCSD project staff, school personnel, architects and contractors in California. The tour will include a half dozen persons from the MHSSC-RPI group and is tentatively planned for the week of August 15-18. It will be organized and conducted by Bert Ray.

- Detailed exploration of the architectural climate in the Mid-Hudson, including meetings with key members of the professions in the state and in the Mid-Hudson valley. The sessions are to assess professional support for such an approach, to draw out possible solutions to problems that will arise, and to explore fee possibilities.

- Detailed exploration of the building contracting climate in New York and in the Mid-Hudson valley. This includes meetings with contractors of all trades, A.G.C. and other contractors' organizations to establish their attitude toward the SCSD-type approach.

- Exploration of New York State's four contract system and the problems it may pose in implementing an SCSD approach.

- Exploration of the labor climate, including discussions with key leaders to assess their reactions and to find ways in which labor would be most sympathetic to an SCSD approach. Included will be an evaluation of the effect of the New York City labor market on the Mid-Hudson area.

- Exploration of the attitudes of the building components industry, including exploratory sessions with Research and Development personnel of a few companies likely to be involved in such a program in New York. Contact would extend both to successful and unsuccessful SCSD bidders.

- Exploration of the State Education Department's Planning Standards which govern all schools built in the State (except in the six largest cities) to see what potential limitations they may place on any aspect of a SCSD approach.

- Exploration of the building codes used by Albany and Yonkers, the two of the State's "big six" that are near the project area.

- Exploration of insurance regulations and policy in the Mid-Hudson area, to determine what effects these may have on an SCSD approach.

- Exploration of the means of financing this type of approach in the Mid-Hudson area. This will key on the willingness of school boards, co-operative boards, the State Education Department and federal legislation to contribute toward such a project.

- A continuing exploration of legal implications, both in forming co-operative agencies and in bidding components for use in the schools.

PHASE III

The third and final phase will complete the detailed investigations and summarize findings. It will include:

- Complete analysis of the procedures and regulations of the State Education Department in all areas related to facilities planning.

- Review of school construction potential in the Mid-Hudson area in the next 5-10 years. This includes exploration of the willingness of school boards and administrators, and of previously-designated architects and engineers to participate and finance the project. This analysis will be carried, in less detail, outside of the Mid-Hudson region.

- Development of recommendations on:

  1. The feasibility of an SCSD-type approach in the Mid-Hudson area.
  2. Definition of appropriate region and building projects included.
  3. Methods of financing.
  4. Procedures for further development.

- Testing of these recommendations in a Summary Seminar; and the publication of findings in October.

Why a Components Approach ?

The 1960s are placing new demands on our schools. Education has progressed from simple instruction accomplished in a one-room school to a complex many-faceted endeavor, resulting in new programs, new groupings, new technological support, and new types of facilities.

Planning these complex facilities takes time - much of it taken in putting the many thousands of specialized parts together. Building these facilities takes time, too -- and money. These problems are further aggravated by the tremendous amount of school construction needed in the next few years.

Many attempts have been made at designing good schools at less cost and in less time. Stock plans, prefabrication, panelization, and modular approaches have all been tried at one time or another. All have some drawbacks, and few have seen real success in the United States.

The components approach which forms the basis for the SCSD project has already proven to be successful in England. It tries to resolve the problems encountered in putting together some major parts of the building by developing a system of parts that all work together. It is hoped that this components system will alleviate many headaches of both architect and contractor, resulting in good buildings without increased cost, and in less time.

The SCSD Approach . . . . . .

Since the SCSD project in California is the closest example of what the Mid-Hudson School Study Council has in mind for its region, it would do well to review the goals that SCSD set for itself:

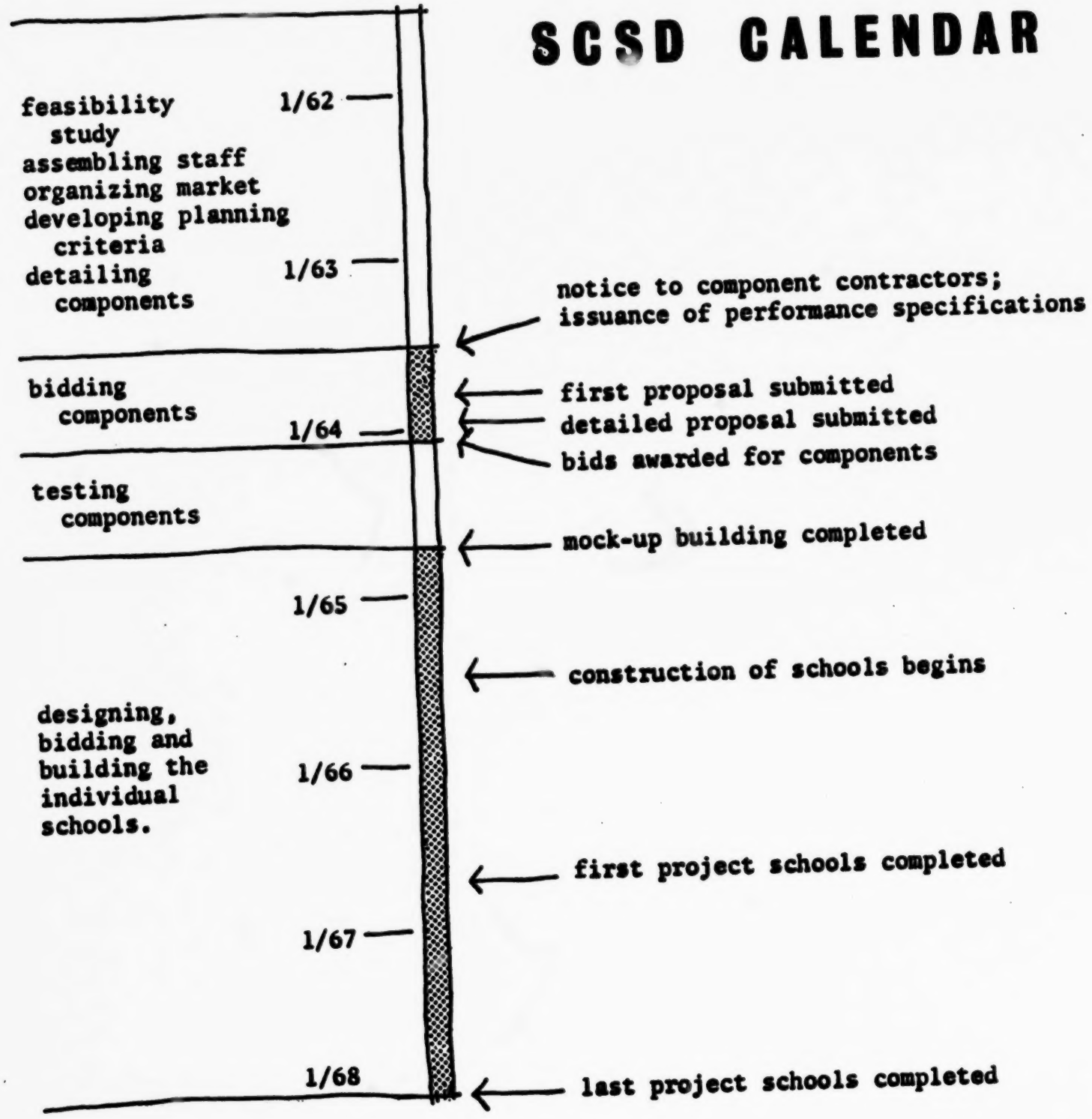
- to develop standardized but versatile building components designed specifically for schools.
- to reduce the cost of school construction by volume production and use of these components.
- to reduce the time needed for building schools by developing a system of components that easily fit together.
- to obtain a workable system of components from manufacturers by assembling a market large enough to guarantee a return for their Research and Development efforts.
- to reproportion the time the individual architect spends in designing a school by reducing the time and effort he needs to put into final drawings, and increasing emphasis on planning and programming.
- to still permit "design freedom" for the individual district and its architect, allowing for differences in philosophy and taste.

..... Its Lessons for the Mid-Hudson

In the left-hand column, for the remainder of the report, is presented the outline approach used by SCSD in California. These steps can be related to the rough calendar presented on the next page.

In the right-hand column on each page, we have jotted down notes, comments made at the Introductory Seminar, and questions still unanswered. It is answering these questions that will complete the study.

SCSD CALENDAR



STEPS IN THE SCSD PROCESS

- 1 Conducting the Feasibility Study
- 2 Assembling the Project Staff
- 3 Organizing the Market
- 4 Analyzing District Needs
- 5 Developing Planning Criteria
- 6 Detailing Component Criteria
- 7 Bidding the Components
- 8 Testing the Components
- 9 Designing the Individual School
- 10 Bidding the Individual School
- 11 Building the Individual School

1

CONDUCTING THE FEASIBILITY STUDY

- In California, one school district planning $ 4.5 million in construction, engaged architects to explore a components approach based on the British plans which were so successful in England.

- As architect Ezra Ehrenkrantz proceeded, it became obvious that a market of $.4.5 million was not enough to interest manufacturers to participate. The companies were talking on a level of $ 20 million or more.

- It became obvious that more districts would have to be brought in. Educational Facilities Laboratories lent a hand with funds to get this initial work underway.

This is the RPI-MHSSC study, which plans to sample appropriate aspects of the architectural, engineering, contractual, labor and manufacturing market in the Mid-Hudson area (and New York State in general) to determine whether an SCSD-type process can be adopted in New York . . and how it should be carried out.

EFL is also lending its support to the Mid-Hudson feasibility study . . the means of financing any actual design and construction project resulting from this feasibility study will also be investigated by the Study Staff.

2

ASSEMBLING THE PROJECT STAFF

- Before carrying investigations any further, SCSD set up a Project Staff. The Staff first consisted of an architect (who had conducted the feasibility study) and an educator (who served as the Project Co-ordinator). It was later expanded to include eight professionals, most of whom were architects.

What types of people should make up the Project Staff? . . . some at the Introductory Seminar felt that a symposium of architects from the participating districts should comprise the Staff, or at least act as advisers to it. In any case, whether the Staff desires new components or even wants to reuse old ones, the need for its existence is real. The type of staffers and their number will depend on many factors: the size of the project, the amount of work the staff will do, the amount of financing it has, etc. Of course, it can grow as the amount of work it must do grows.

- A project advisory committee of superintendents, educators, and architects was set up to continually advise the Project Staff.

An advisory committee is a good idea. It probably need not be as large as SCSD's (unless the Mid-Hudson project receives foundation support).

- A series of technical advisers were called in to aid in writing the performance specifications and supervising the development of components.

It appears that the technical consultants can be most valuable, their role depending on how much design development the Project Staff wants to undertake on its own. These men can be hired on a part-time (or even one-shot) basis, thus keeping costs down.

- Support in assembling and sustaining the Project Staff throughout the project was provided by Educational Facilities Laboratories. The cost to EFL has been several hundred thousand dollars.

Just how this support can be gathered for continuing a second SCSD-type approach is a major question . . . while its amount need not be as high as the cost of the California study, some means must be found to support the Staff and get the project rolling. The State Education Department and federal legislation may help, but other ways and means must be investigated.

3

ORGANIZING THE MARKET

- SCSD found out that organizing the market was a two-step process -- first, it had to be determined from manufacturers how large a construction volume would interest them in developing new components, and, secondly, a group of school districts who would provide this market had to be put together.

Organizing the market is a kind of juggling act . . both steps in the process have to be accomplished pretty much at the same time. The Project Staff, however, should have a good-enough estimate from the manufacturers to start assembling districts.

- Discussions were held with many different manufacturers, and it appeared that both a minimum and a maximum value of construction should be set; the former to get manufacturers interested and the latter to allow "small but creative" companies to stay in the bidding. SCSD estimated the minimum to be $ 21 million (1.4 million sq.ft.) and the maximum about $ 37 million (2.4 million sq.ft.).

The size of this "guaranteed market" may vary for many reasons in New York (but it probably will not range too far afield from that in SCSD). We might ask these questions, though:

- *how much "safety factor" did manufacturers build into their estimates. (If there were safety factors, will they drop on a second go-round?)*

. . was there a need for the maximum limit?
. . how would the values change if the Project Staff were to design its own components (and not saddle manufacturers with high research costs?)
. . how much of a potential market outside of the consortium is available?

- In order to get interested districts together, the SCSD contacted by mail every district in the State; followed up by interview those who expressed an interest; and finally brought the thirteen together.

By the time the Study is completed, we ought to have a good appraisal of the market potential in the Mid-Hudson area.

- A California Joint Powers Agreement was used to legally constitute the Consortium. Districts were committed by the agreement to the plan, and could drop only in the case of bond issue failure.

So far it appears that there will be few legal problems in bringing the Consortium into being in New York. The types of agreement and committments required are being checked to make sure. Section 119-o of the General Municipal Law spells the procedures out.

- The 13 school districts in the SCSD Consortium* were roughly in areas with the same climate and under the same building codes (to minimize regional variations).

This should pose no real problem in the Mid-Hudson area. Climate is nearly the same throughout, and all schools are governed by the State Education Department Planning Standards.

- It was found that formation of the individual districts into the Consortium required a great deal more co-operation and interaction between districts than they were used to. All schools in the Consortium were public schools.

Can the individual districts work together in harmony? This depends on the districts, of course, but New York State's history of regional co-operation (as evidenced by the number of BOCES boards and School Study Councils operating in the State) should provide a good take-off point.

Will it be possible to incorporate private and parochial schools in the Consortium?

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* The Consortium is named the "First California Commission on School Construction Systems"

ANALYZING DISTRICT NEEDS

- As a next step, the SCSD Project Staff undertook to analyze each of the participating districts in terms of its building needs. This was in the form of interviews and seminars which zeroed in on two types of needs: (1) physical requirements: number of schools, sizes, locations and completion dates, and, (2) educational requirements: kinds of spaces required.

It appears that this analysis is not as simple as it sounds . . . are most districts geared to look hard and deep at educational requirements, both now and in the future? The SCSD Project Staff helped here by making checklists and guidelines to help the districts get their needs "down on paper". This may have to be done in the Mid-Hudson area, too. Perhaps the State Education Department can play a role here.

- The Project Staff assembled the requirements of the districts into a kind of a "master educational spec" from which to develop overall planning criteria.

- Physical space requirements were worked into an informal "master plan" trying to even out construction throughout the Project.

- Most district architects were chosen during this stage.

Many at the Introductory Seminar felt that district architects should have been chosen before this . . perhaps they should have made up the Project Staff from the beginning . . in any case, they should be brought in earlier.

5

DEVELOPING PLANNING CRITERIA

- Using the "combined" educational requirements of the 13 school districts as a take-off point, the SCSD developed a series of major implications these requirements have for facilities. At this point, restrictions set by building codes and by the California State Education agency were analyzed for any influences they might have on overall planning criteria.

- These overall planning criteria may begin to suggest the types of components the Project Staff will want to head toward, or to steer away from.

This is an important part of the SCSD process that cannot be overemphasized -- facilities must in every way possible speak for the educational requirements behind them. A look at some of SCSD's overall planning criteria, and the notes or questions we have jotted down, will show that overall criteria for schools in the Mid-Hudson are likely to be much different.

OVERALL PLANNING CRITERIA: SCSD

1. Campus planning approach to designing schools; only 1%-2% of project area on the second floor

. . this "all-on-the-ground-floor" has much less validity in New York. What changes will it make in the final components chosen?

2. A need for nearly 100% flexibility of interior space; there will be constant need to rearrange space. This calls for a high degree of demountable and operable partitions.

. . is "near-total" flexibility a necessary thing? Does a careful analysis of educational needs, the groupings used, and the programs employed really demand this flexibility? Spaces for large-group instruction, for assemblies, for physical education are pretty much set already. Others are semi-fixed (science labs, kitchens, shops, etc.).

. . and the flexibility that is needed -- what kind is it? Hour-to-hour, day-to-day, or year-to-year? No school needs to be 100% flexible from hour-to-hour. These considerations have a great effect on the components chosen.

3. Limited use of glass in the exterior wall; liberal use of overhangs to shade glass and to cover walks.

. . the Southern California climate lends itself to designing schools as blocks of classrooms turned in away from the hot sun. This same warmth allows for "outside corridors". The Mid-Hudson's requirements will be radically different; large glass areas to bring the sun into the classroom, and little or no use of outside corridors.

	. . "interior" classrooms are also generally unacceptable to the State Education Department in New York.
4. Long spans to allow for interior flexibility.	*. . the need to provide for snow loads in New York will make long-span solutions a problem.*
5. Air conditioning to some degree.	*. . valid in New York? Probably, considering the SCSD solution found that it did not cost that much extra to cool, too.*
6. Slab on grade.	*. . this may hold up construction of SCSD schools . . perhaps it should be a component, too.*
7. Horizontal planning module of 5' x 5' and vertical planning module of 1'.	*. . these were to make sure all components were being developed on the same basis . . is there anything sacred about these numbers?*
8. Special construction types as specified by California codes; firestopping requirements, and earthquake restrictions all spelled out in the codes.	*. . this calls for an analysis of applicable codes in New York. This is currently being undertaken by the Study Staff.*

6

DEVELOPING COMPONENTS CRITERIA

- At this time, using the overall planning criteria as bases, the SCSD Project Staff selected the parts of the building that would be pursued as components.

- The four basic components selected by SCSD comprise about 50% of the cost of the school building . . . There are many factors which contributed to these choices, some objective, some subjective. To SCSD the Structural System, for instance, could be a component (making it more or less uniform in each school). In contrast to this, SCSD felt that it should stay away from developing an exterior wall component: this might place too many limitations on the individual architects. Even more subjective is considering "what the market will bear", that is, will overindulgence in components destroy the favorable climate the Project Staff has gained with architects, contractors and labor?

The point here is whether an analysis of the Mid-Hudson's planning criteria will lead to the same decisions that were reached in California. Typical of the questions we want to ask ourselves are . .

. . what percentage of Mid-Hudson buildings should be pursued as components?

. . is there anything sacred about four major components? should there only be two? or twenty-two?

. . are there more logical combinations of building parts than those used in SCSD? (The fact that one company got the components contract for both structural and ceiling systems in SCSD may be significant).

. . can district architects be given some choice whether or not to use the components or some of the components?

- After selecting the components to be developed, the SCSD Project Staff wrote a series of performance specifications on each. These performance specs concentrated on what the components should do (what loads and spans they cover, fire ratings, etc.) rather than what they should be, or what material they should be made of, or what they should look like. These performance specs became the basis for component bidding.

- In all cases, components must work together to form an integrated system.

- There follows a brief listing of general requirements SCSD set for each of the component categories it decided to take bids in.

Many at the Introductory Seminar felt that the role of the Project Staff could be different . . . rather than just writing performance specs and leaving design (and expense) to the individual manufacturers, why not have the Staff design the components or the component connections? In the latter case, manufacturers' development costs could be cut and many of the coordination problems between the components could be solved . . but does this restrict the ingenuity of American industry too much? A case can be made for either point; opinion at the Seminar was divided and a middle road may be the answer.

In any case, we suggest that the restrictions on component design (whether done by the Project Staff or the manufacturer) be as non-regional as possible. This allows even unsuccessful bidders to market their products if they desire.

SCSD REQUIREMENTS FOR THE ROOF/ STRUCTURAL SYSTEM:

1. Must permit a variety of plan configurations.

2. Must reflect a 5' x 5' horizontal planning module and a 2' vertical module.

3. Exposed structure desired.

4. One hour fire rating deemed necessary.

5. Ready rearrangement of interior space without interference from any permanent supports.

6. Horizontal spans from 30' to 110' with 60' to be considered the most frequent -- thus most ecnonmical -- interior span.

SCSD REQUIREMENTS FOR LIGHTING/ CEILING SYSTEM:

1. This component must contain all lighting, ceiling, and acoustical members.

2. A high 70fc illumination level required, but with very low fixture brightness to minimize glare. For this reason, at least half of the ceiling will have to be a lighting source.

3. Ceiling has to maintain its continuity as partitions are changed beneath it.

4. Lighting/Ceiling system has to pick up all the requirements of the "service sandwich" that have not been fulfilled by the other components.

SCSD REQUIREMENTS FOR THE AIR CONDITIONING SYSTEM:

1. System must allow for a great deal of local environmental control since interior space will be rearranged many times.

2. Air handling and cooling equipment must be designed to serve each "zone" of 450 sq. ft. independently, regardless of how these "zones" are arranged in the building plan.

3. The control system for the air handling equipment must be flexible enough to change with the changing of interior space arrangement.

4. Prices asked for heating only, and for heating and cooling.

SCSD REQUIREMENTS FOR INTERIOR PARTITIONS SYSTEM:

1. Partitions must fit anywhere on a 4" planning module, and must provide for all possible joint conditions.

2. Thirty-five different colors required.

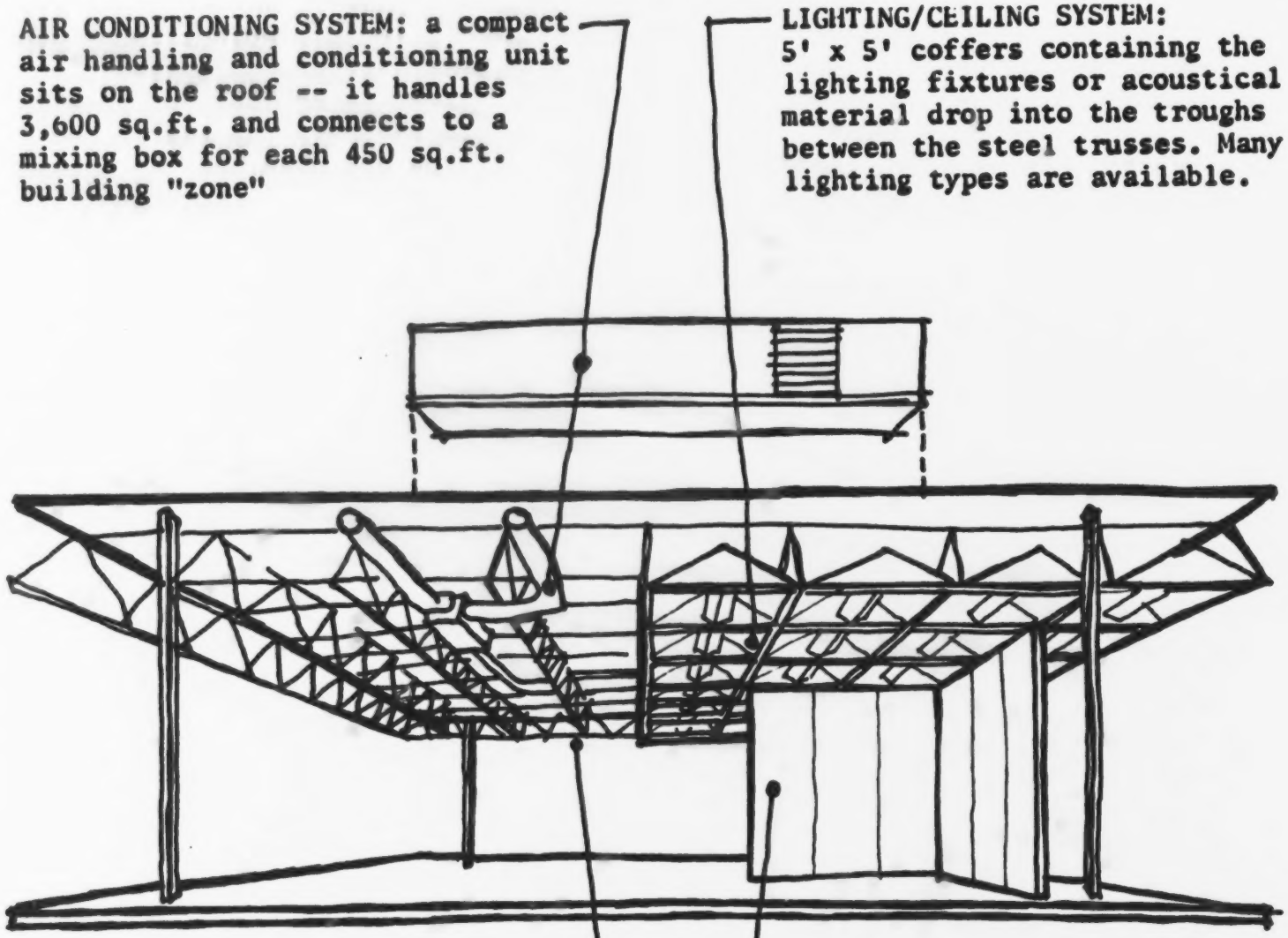
3. More than 60% of the interior partitions are required to be moveable (includes demountable and immediately moveable).

4. All panel faces (integral tack- and chalkboard coverings, etc.) must be independently interchangeable.

5. Fixed, demountable and moveable (panel & accordion) required.

AIR CONDITIONING SYSTEM: a compact air handling and conditioning unit sits on the roof -- it handles 3,600 sq.ft. and connects to a mixing box for each 450 sq.ft. building "zone"

LIGHTING/CEILING SYSTEM: 5' x 5' coffers containing the lighting fixtures or acoustical material drop into the troughs between the steel trusses. Many lighting types are available.



ROOF/STRUCTURAL SYSTEM: long-span trusses which are integral with the roof deck to allow them to "work together" in carrying loads. These come in easy-to-stack units and are unfolded on the job.

INTERIOR PARTITIONS SYSTEM: the partitions are fixed, demountable or operable (both panel and accordion types). They hang from the structural system and have interchangeable faces.

- The lowest combination of bidders whose proposals could be worked into a successful components system was chosen.

Since it is imperative that the successful proposals do form a workable system, will there be problems of not always being able to choose "the lowest responsible bidder"?

- Before bids were received, the Project Staff formulated a composite price for the project which the bids could not exceed. (if they did, there would be no cost advantage at all to using components). Bids came well under this ceiling. Also, an escalation clause (see "general bidding points", overleaf) was built in to allow for rising prices during the project.

Since manufacturers have to include some of their Research and Development costs in the bids, would it be more economical to have the Project Staff design the components?

Is the escalation clause used by SCSD the best way to handle price adjustments in time? . . are there other ways?

GENERAL POINTS ON SCSD BIDDING:

1. In order to have a basis for bidding, bidders were asked to submit proposals for 1,400,000 sq.ft. of building. They were advised that the maximum total would not exceed 2,400,000 sq. ft. of building.

2. Bidders were told the dates between which the buildings would be ready for occupancy.

3. Locations and probably sq.ft. areas of schools in the project were given for site inspection, scheduling, etc.

4. Final manufacturers' bids are to serve as irrevocable offers to the districts in the project. In order for the project to proceed, manufacturers would have to receive firm commitments for 1,400,000 sq.ft.

5. All final contracts for purchase and installation of components are to be made between manufacturers and the individual districts. Standard contract forms are included as part of the performance spec-contract document package.

6. Lump-sum bidding used by manufacturers at original bidding, with unit prices for use in individual projects to be worked out later.

7. Components contractors must agree to abide by the scheduling set up by the general contractor on every job.

8. Bids can be submitted in any or all of the component categories by a single company.

9. Different bids may be submitted to allow for a component's relation to others. A mechanical system, for instance, may differ in cost depending upon what structural system is used.

10. Bidders in one category may accept sub-bids from bidders in other categories to allow for integration of the work.

11. 5% bid bond was required.

12. An escalation factor is built into each bid to allow for rising prices between bidding and the furnishing of the component. This factor is tied to a predicted price rise -- if this turned out to be inaccurate, a rebating system, based on a national cost index, is included.

TESTING THE COMPONENTS

- SCSD's components contract called for a two-stage testing and development program. The first phase consisted of a mock-up of a typical part of a building. On the basis of experimenting with this, the successful solutions were best worked into an integrated system.

A question here has to do with getting the various companies to work together . . did they do it willingly or did the major burden of this task fall on the Project Staff?

- The second phase consisted of a 3,600 sq.ft. mock-up building. Testing is continued here, and the building eventually becomes the property of Stanford University.

- Unit prices are determined by the manufacturers, and the components put together into a "Components Catalog" for use by the district architects.

Whether or not it will be necessary to build so large a mock-up in the Mid-Hudson will probably depend on how much different components turn out to be from those used in California. It might be more logical, too, to treat a first project school (or addition) as the mock-up, rather than building a totally separate structure.

DESIGNING THE INDIVIDUAL SCHOOL

- Each of the district architects building an SCSD school received a "Components Catalog" which gave him the range of selections he had in designing the individual school, and the working details of the components.

- Actual planning and design, then, proceeds on a regular basis. Being able to incorporate already-drawn components into the working drawings should have given SCSD architects more time for the preliminary planning and programming work. Certain restrictions (such as SCSD's 5' x 5' horizontal module and 1' vertical module) are inherent in the approach.

- So far, only a few of the SCSD schools have "been on the boards".

It will be interesting to find out just how much compromising of the architect's traditional freedom to design when he chooses is built into the components used by SCSD . . . SCSD felt that widely varying schools could be designed around its components.

It will also be interesting to find out if the components restrictions (planning modules, etc.) forced much change in architectural office routine.

Finally, did SCSD succeed in its acknowledged goal of shuffling architect's time to doing more preliminary work? Will architects in the Mid-Hudson feel this is what will happen, or that components may be employed only as a means for cutting fees? This study will investigate these concerns.

10

BIDDING THE INDIVIDUAL SCHOOL

- At this point the plans for the SCSD schools were completed and bids taken on the portion of the building not included as components. This covered about 50% of the SCSD schools.

- The California contracts were set up so the components contractors were pretty much separate from the General Contractor, agreeing only to abide by his scheduling and general policy.

It looks like the actual form of the construction contracts will be a problem in New York State. The single construction bid taken (for all work other than components) clearly placed project co-ordination in the hands of the general contractor; even the components contractors agreed to let him co-ordinate the work. In New York, all public work in excess of $25,000 requires four separate prime contracts. How is the all-important co-ordination handled in this case? Many at the Introductory Seminar felt that the SCSD approach would not work in this separate-contract framework. If so, what can be done? The Study team is now investigating some alternatives.*

* *General Construction; Plumbing; Heating, Ventilating and Air Conditioning; Electrical.*

Another problem may be the "or equal" clause mandated by the state in public construction contracts. If the component is not totally owner-supplied, the law appears to state that its inclusion in the bidding documents invites anyone bidding on it (as long as they can provide an "or equal" or equivalent to the component as described in the specification). While this may result in as good a component as the one developed originally, how can the district guarantee the developing manufacturer that he will get to furnish the component? (After all, this was the basis on which the component was developed in the first place) . . . What ways are there to approaching this problem? . . . how about state purchase of the component and resale to the individual districts? This whole question will probably require some legal untangling.

. . what reactions do general contractors have to bidding on work where some of the sub-contractors (or even co-contractors) they must work with have already been selected?

. . what reactions do general contractors have to bidding on work where much (50% in SCSD) of the building cost is already set? Will the contractor accept this (since it also cuts estimating costs by that 50%) or will he be disturbed by not being able to "shop around" for prices?

At this point, everyone is waiting for bids on a SCSD school. How low will they come in? How much of a "contingency factor" may be included by cautious contractors?

Since none of the SCSD schools has yet been built, there are many questions we can ask that will remain unanswered for the present.

. . will there be a time saving as hoped for by the Project Staff? or will the "other 50%" of non-components work hold up the job? or may certain facets of the components themselves cause delays? have the SCSD schools been scheduled so component manufacturers are not pressed to produce a tremendous volume of parts all at the same time, thus causing delays?

. . how much effect does using components have on the general contractor's office and field practices? are many changes in routine needed? have any tried CPM or other of the newer means of scheduling to speed the work?

. . will there be any problems in job supervision? are the lines of responsibility between architect, Project Staff, contractor, and components contractor well defined?

. . what problems of trade jurisdiction can be forseen? This could be a real problem. Who, for instance, installs SCSD's integrated lighting-ceiling-acoustical assembly?

. . in California there were some problems of union labor having to install manufacturer-made components that did not go through a trades contractor. Does this indicate trouble in New York?

. . where should labor problems be discussed? perhaps on higher, more co-ordinative levels in order to "get to the root" of problems.

Since you are interested in the feasibility of an SCSD-type process in the Mid-Hudson region, we would appreciate your response to this progress report . . . . please address your comments, reactions, questions, and any additional information to one of the Study Staff or Study Committee listed on the opposite page.

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P A R T I C I P A N T S

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